REMARKS

Claims 1 - 10 are currently pending in the application. By this amendment, claims 1 - 10 are amended for the Examiner's consideration. The foregoing separate sheets marked as "Listing of Claims" shows all the claims in the application, with an indication of the current status of each.

Claims 1 – 10 have been rejected under 35 U.S.C. 112, second paragraph, as being indefinite. This rejection is traversed.

Claims 1 – 10 have been amended to provide proper antecedent language. Claims 1, 2, 3, 6, 7, and 8 have been amended to change the phrase "historical behavior and published data" to read "historical failure data and/or published failure data." This amendment does not constitute new matter and is fully supported by the specification in paragraph [0020] which states,

> "This method uses **historical failure data** recorded in maintenance transaction management systems **and other relevant data** such as expected lifetimes of components or machines **published** by the equipment vendor, or publicly available failure data ..."

The amendment eliminates "historical behavior" from claims 1 and 6.

Claims 1 – 10 have been further amended to more consistently use the correct antecedent language for each of the different probabilities utilized by the subject invention. Specifically, claims 1 and 6 have been amended to clearly differentiate the calculated probability of failure from the historical data and the probability of failure for each component from the computed overall failure probability of each component. This change does not constitute new matter and is fully supported in the specification. Paragraphs [0034], [0035], and [0036] describe a process for calculating the probability of a component failure from data for the specific equipment under test while paragraph [0044] and [0045] speak directly to the

probability of a component failure from historical data. These probabilities are combined to compute the overall failure probability which is described in paragraph [0057]. Thus, to avoid confusion on "reliability theory", an example of which is specifically described in paragraphs [0034] to [0047], these words have simply been eliminated from the claim

Claims 2, 3, 7, and 8 have been amended to provide antecedent agreement with the respective base claim. Specifically, the phrase, "...specified by the user..." has been amended to read, "received from said user.." The independent claims 1 and 6 require the subject invention to be capable of, "...**receiving** an equipment problem description from a user..."Claim 6 has been further amended to make a typographical revision to delete the duplicate words, "...the calculated..."

Claims 1 – 10 have been rejected under 35 U.S.C. 102(e) as being anticipated by U.S. Patent Publication 2004/0250166 to Dahlquist. This rejection is traversed.

The subject invention differs from the patent publication 2004/0250166 by Dahlquist et al. in two important ways. First, a basic feature in Dahlquist is the classification of incoming information into discrete states (e.g. high, medium, low) and subsequent processing of the states (claims 1, 5, 6). The method of the subject invention uses incoming information as-is and does not classify it. Second, the method presented by Dahlquist focuses on monitoring incoming information, detecting an abnormality, then finding the root cause. Dahlquist first classifies the incoming information and then uses three different techniques (Bayesian inference system, Neuro-fuzzy inference, and case based reasoning, as shown in Fig. 2) at three distinct levels to process these states. Case based reasoning is used to search for the abnormal equipment within the plant (paragraph 0079). Bayesian inference is used to determine the root cause behind the abnormality detected by case based reasoning (paragraph 0081), and neuro-fuzzy inference is used for searching in the horizontal direction among processes or stages within the plant (paragraph 0082).

In contrast, the method of the subject invention addresses finding the failed component (which can be viewed as the root cause) within a machine which is known to have failed. This is achieved, as set forth in claims 1 and 6, using a common framework of two very different techniques (case based reasoning and reliability analysis) and by integrating or combining the results of these two techniques under the framework. While one can adapt Dahlquist to a hierarchy of components in a single machine, the adapted method will be very different from the method of the subject invention. The potentially adapted method from Dahlquist would still apply the three techniques in sequence in different parts of the component hierarchy, while, in contrast, the method of the subject invention applies two techniques independently in the entire component hierarchy and then combines the two results to produce a single list of failed components ranked by probability of failure. Further, the Examiner will recognize the two techniques used by the subject invention, and which are specified by the process steps of claim 1 and elements of claim 6, are not the same as the set of three techniques proposed by Dahlquist.

As for claims 1 and 6, the database referenced by the Examiner in Dahlquist does not contain the same data as that in the subject invention. The Examiner has incorrectly identified element 31 as a database. Block 31, as stated in Dahlquist paragraph [0067] pertains to "...information signals may be processed by block 31..." Thus, Block 31 is a processing element and not a database. Block 24 of Dahlquist is described as a database in paragraphs [0070] and [0071]. However, the type of data described by Dahlquist does not suggest that this is a ~~case based database~~ as is specifically recited in the claims of the present application. The case base database of the subject invention clearly identifies each record as including: the identification of the machine or machine-process combination if the machine is capable of more than one process, and indication of failure of each component within the machine, and a description of the problem as seen by the maintenance technician as discussed in

paragraphs [0028] – [0031]. Dahlquist simply describes the data in the database in paragraph [0061] as. "...simulated data and/or computed data. The data may also include distribution of continuous variables." Thus Dahlquist is not looking at the database in a case base fashion.

The Examiner has equated the case base reasoning shown in Dahlquist Fig. 2 and Fig. 5, block 35 with the case base reasoning of the subject invention. This is incorrect. The case base reasoning, as discussed above is performed on data after it has been classified (Fig 2, blocks 27 and 26). However, the case base reasoning of Dahlquist is used only with the data that has been classified and not the entire collection of data available. Furthermore, as stated by Dahlquist in paragraph [0079],

> "The case based reasoning is used for detection occurrence of an event such as abnormality. The case based reasoning may be used for detection of abnormalities or failures in a direction from the top plant level down to process sections and groups of equipment."

That is, the case base reasoning is performed only down to the identification of the specific failed equipment and not to the failed component within the identified equipment. Performing case based reasoning to the component level is not an obvious improvement over Dahlquist as the structure of the data (classified) in Dahlquist does not lend itself to detailed component level case base analysis. Hence, the need for Dahlquist to use additional analysis techniques to complete the processing to the more detailed level. Therefore, Dahlquist does not provide a case base database which is the same as or similar to that specified in the claimed invention nor does Dahlquist provide case based reasoning analysis to identify the failure to the component level as does the subject invention.

With regard to claims 2 and 7, the single list of suggested failed components of the subject invention is provided using case base reasoning as stated in claim 1,

"...for each component in said equipment, calculating probability of matching problem description assuming that a component fails, using case based reasoning..."

Since claim 2 depends from claim 1 and claim 7 depends from claim 6 respectively, the features of the base claims define the failure to a component level using case base reasoning, the list of suggested failed components is developed using the case base reasoning. Dahlquist, as discussed above, does not develop a list of failed components using case base reasoning. Dahlquist uses case base reasoning to identify fail equipment within a plant and does not use case base reasoning for the specific failed component identification.

Referring to claims 3 and 8, as discussed above, Dahlquist does not create the list of failed components using case based reasoning as does the subject invention. Therefore, Dahlquist does not provide the feature of the subject invention that is, "...producing a list of probabilities of failure corresponding to said single list of suggested failed components...using case base reasoning."

With respect to claims 4 and 9, Dahlquist uses the word hierarchy to differentiate the levels at which the different types of analysis techniques are applied. As stated by Dahlquist in paragraph [0082] – [0087], case base reasoning is used in a top down approach to identify the failed equipment within a large plant of equipment. Bayesian technique uses the failed component to identify in which equipment the failed component is most likely located. This is different from the subject invention which is using a hierarchical data structure to obtain historical data about the components within their respective equipment. A hierarchy in terms of the subject invention is analyzing all the data necessary to obtain a solution starting at the lowest equipment level in which the component is associated. The hierarchy is only exercised if insufficient data is found at this lowest level. Dahlquist can only process the reliability data in a hierarchical fashion such that the case base reasoning only

identifies failures to an equipment level. The Dahlquist progresses to another level in the hierarchy using the Bayesian technique to obtain a failure probability at the component level.

As for claims 5 and 10, similarly as for claims 4 and 9, the subject invention is using a hierarchical data structure to obtain historical data about the components within their respective equipment. A hierarchy in terms of the subject invention is analyzing all the data necessary to obtain a solution starting at the lowest equipment level in which the component is associated. The data from the upper levels of the equipment hierarchy are only exercised if insufficient data is found at the lowest level. This is not the same concept of hierarchy as for Dahlquist. Dahlquist actually performs processing at different levels in order to obtain a solution. Dahlquist uses the case base reasoning at the equipment level and Bayesian inference at the component level. Case base reasoning is not applied by Dahlquist at the component level and therefore, a hierarchy of data is not used to create the probability list as required by the subject invention.

In view of the foregoing, it is requested that the application be reconsidered, that claims 1 - 10 be allowed, and that the application be passed to issue.

Should the Examiner find the application to be other than in condition for allowance, the Examiner is requested to contact the undersigned at 703-787-9400 (fax: 703-787-7557; email: mike@wcc-ip.com) to discuss any other changes deemed necessary in a telephonic or personal interview.

If an extension of time is required for this response to be considered as being timely filed, a conditional petition is hereby made for such extension of time. Please charge any deficiencies in fees and credit any overpayment of fees to Deposit Account 50-0510 (IBM-Yorktown).

Respectfully submitted,

Michael E. Whitham
Reg. No. 32,635

Whitham, Curtis, Christofferson & Cook, P.C.
11491 Sunset Hills Road, Suite 340
Reston, VA 20190
703-787-9400
703-787-7557 (fax)